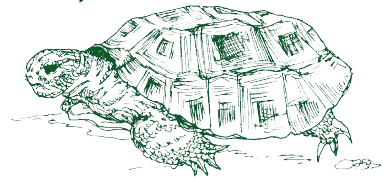


ANIMALS



Although at first glance the desert seems to have little in the way of wildlife, it actually contains large, diverse populations. The desert environment may seem an unlikely place for animals to thrive or even exist. However, desert animals have *adapted* to their environment, and each fills an important *niche* in the desert *ecosystem*.



ANIMALS

Beating The Heat

Desert animals have developed a variety of strategies for thriving in a land of extremes. One of the most common is to be active only at night, when the desert is coolest. Animals mostly active after dark are called nocturnal. Foraging for food and water at night also allows animals to use the dark for protection from predators. Since many desert animals are nocturnal, the desert may seem empty to those of us who travel through during the day — all we see of many desert dwellers are the tracks they leave behind.

Some desert animals are active only in the early morning and at twilight. Lizards, snakes, rodents, and insects seek shelter in cool, humid burrows or shade themselves under rocks and bushes. Owls survive by being nocturnal, eagles by soaring high above the earth where temperatures are much cooler. Phainopeplas (a bird) use a different method of dealing with the summer heat; they migrate to cooler climates when it starts to warm up.

Because of their large ears, jackrabbits and mule deer have the ability to radiate heat. Blood vessels in their ears are located just under the skin, and air flowing around them cools the blood. This cooled blood circulates through the rest of the body, picking up more heat to carry to the ears for “disposal.” Ants, beetles, and lizards reduce the amount of heat they absorb by straightening out their legs as they walk across the hot desert terrain.

Drinking What You Eat

No animal can survive for long without water. Wood rats get their water by eating juicy cacti and other plants that contain moisture. Snakes get the moisture they need from the mice

and other small animals they eat.

Kangaroo rats and pocket mice get much of the moisture they need from their diet of dry seeds. Seeds stored in their humid burrows absorb moisture from the air. Animals utilize this moisture when the seeds are eaten. Kangaroo rats also chemically manufacture water (called metabolic water) from dry seeds as they are being digested.

Desert bighorn sheep get some of the moisture they need from what they eat, but they also have to drink water. In the desert, water is usually found in springs or rivers and occasionally in ponds and rock pools after a rain. Because these animals rely on this water, their territory is limited. They can’t wander too far from reliable water sources.

Sleeping Through It

Another method used by some desert animals to avoid drought and heat is to sleep through it, just as some cold-climate animals hibernate through the winter. This dry, hot weather sleep is called estivation.

One well-known desert estivator is the spadefoot toad. Spadefoot toads can survive in underground burrows for months or even years, covered with a jelly-like substance that keeps them moist. They come out of estivation when heavy raindrops cause vibrations in the earth that wake them. They will then dig to the surface, find a mate, and lay eggs in the pools created by the rains. The toads then burrow back into the ground and estivate until it rains again. The tadpoles that hatch from the eggs must grow quickly, before the pools dry up. Only a few survive to adulthood.

Some animals estivate not only because of heat and dryness, but because of a shortage of food. Plants and other sources of food tend to die back in the hottest and driest part of the year. Some desert rodents, spiders, and snails

estivate to avoid this scarcity of food.

The activities in this section have been designed to teach children about the animals of the Mojave Desert. All animals except one have developed techniques for dealing with the often harsh desert environment. Humans, instead of adapting to the environment, often try to adapt the environment to meet their needs. These activities will give students ideas of what they can do to help protect the fragile desert ecosystem and an understanding of why it is important to do so.

Activity 1 Camouflaged Critters

OBJECTIVES: List two ways animals use *camouflage* to their benefit. Describe the difficulty predators have when searching for food (camouflaged animals). Name two common Mojave Desert animals that use camouflage as an *adaptation* for survival.

MATERIALS: Flagging tape, modeling clay, pictures of camouflaged animals (especially those native to the Mojave Desert).

SUBJECTS: Art, language arts, science.

SKILLS: Application, comparison, description, invention, observation, writing.

METHOD: Students will compare pictures of insects, animals, and birds. They will observe the benefits of shape and protective coloring. They will then create a camouflaged critter.

Animals are adapted to their environment in order to survive. For instance, a horned lizard is usually the same color as the ground it lives on, a desert side-blotched lizard is colored to look like the plants it lives on, and many

snakes use their coloring as camouflage when they rest in the shade of bushes. Often, animals adapt to changes in their *habitats* by using camouflage to avoid predators. Camouflage gives the organism the ability to blend with its surroundings.

1. Introduce or review the concept of adaptation. Show students pictures of desert animals that use camouflage as an adaptation for survival. Have students brainstorm types of camouflage and the benefits of this adaptation.

2. Mark off two different areas outside with flagging tape. Make the two areas a short distance apart. Separate the class into two groups and assign each group an area.

3. Pass out a small ball of clay to each student. Instruct the students to go to their area and create camouflaged critters with their balls of clay by using fallen sticks, leaves, or bits of gravel. Instruct the students to create critters that blend with their environment. Give them about fifteen minutes to work.

4. Have group one place their critters in area one. Make sure to tell them they cannot hide the critters. They must be camouflaged in their surroundings. Give them about five minutes to place their critters. At the same time, have group two place their critters in area two. Be sure to emphasize that neither group can watch where the other group is placing its critters.

5. Ask both groups to step away from their area. Inform the students that they have magically turned into birds and must now find food. Ask them to hold one cupped hand on their stomach (to hold their food). Two fingers on their other hand become their beak. Group one will now have to find food (the camouflaged critters) in area two, group two in area one. Count to three for the food search to begin.

GLOSSARY

adapt — to fit in, to be suited for getting the things needed for survival.

adaptation — special tools for survival, physical or behavioral characteristics that make an organism more suited to its *environment*.

biological community — all of the living things, both plants and animals, living in a particular *environment*, working together to fulfill their individual needs.

camouflage — an adaptation which enables an organism to blend with its environment.

ecosystem — the interaction of the *biological community* (all living things) and the physical *environment* (water, air, minerals).

environment — all those factors, both living and non-living, which make up the surroundings of an organism.

habitat — the place where a plant or animal lives, an organism's home. Provides food, water, shelter, and space in a *suitable arrangement*.

mimicry — a form of protective coloration, or acting, in which an animal closely resembles another kind of animal or object in its *environment*. The animal being mimicked usually has toxin which causes predators to avoid it. By imitating the toxic animal, the other animal may avoid getting eaten.

niche — an organism's special function within its *environment*.

predation — the natural act of animals that kill other animals for food.

predator — any animal which hunts live animals for its food.

suitable arrangement — when those things necessary for survival (food, water, shelter, space) are accessible, adequate in quantity, and in keeping with the biological lifestyle of a species.

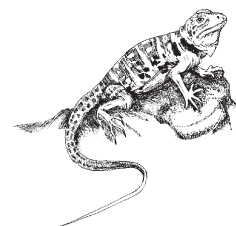
territoriality — a behavior pattern in animals consisting of the occupation and defense of a living space.

6. Call time after ten minutes and have both groups display their food in a designated area. Hold a viewing party, asking students to see if their clay critter was found.

7. Travel in a group to the undiscovered critters. Discuss with students why some critters were found and others were not. What special trait or habitat helped camouflage the critters? What animals in the Mojave Desert use camouflage as an adaptation for survival? Can you think of any other types of adaptations?

8. Remove sticks or rocks from the clay and return those items to their natural setting.

EXTENDING THE EXPERIENCE: Students can write about the experience and what they learned about camouflage.



ANIMALS

Activity 2 The Comforts Of Home

OBJECTIVES: Examine and list the minimum requirements for human life. Compare these requirements with those of desert animals.

MATERIALS: Crayons, paper.

SUBJECTS: Art, science, social studies.

SKILLS: Analysis, application, discussion, drawing, inference, listing, observation.

METHOD:

1. Ask students to draw pictures of their own homes. Have them think about and draw pictures of the four most important things in their homes.

2. Make a list of what the students feel are important. Differentiate between needs and wants. Challenge children to think about what is essential for survival. Make sure this includes food, water, shelter, and space. Explain that these must also be available in a *suitable arrangement*. Whenever one of these basic needs is threatened or removed the animal may not be able to survive.

3. Show students pictures of desert animals and ask them to draw one of these in its *habitat*. Make sure this drawing includes where the animal gets food, water, shelter, and space.

4. Compare the needs of humans with those of other animals.

EXTENDING THE EXPERIENCE: Have students go outside and look for animal homes. When a home (crack, burrow, nest, etc.), is found, discuss what might live there and why it chose this location. Are all of the essentials needed for survival found nearby?

Activity 3 Desert Homes Bingo

OBJECTIVES: Identify three different types of animal homes and who might live there. State two ways animal homes are inadvertently destroyed by humans.

MATERIALS: Discovery Activity Page #1, pencils or wax markers. (You may wish to consider laminating the bingo cards so they can be used several times and marked with wax pencils.)

SUBJECTS: Art, language arts, physical education, science.

SKILLS: Description, discussion, drawing, listing, observation.

METHOD: All animals need a home of some sort. This home will usually provide them with shelter and protection from predators. Different animals have different needs and, therefore, have different types of homes.

1. Ask students to describe their homes. Identify the type of animal homes found in the area (nest, burrow, hole, water, crack, etc.).

2. Give each student a bingo card and marker. Take them on a short walk through the desert. Have students find an animal home and name an animal that might live there. Place an X on the appropriate square. Play continues until everyone gets bingo.

3. Conclude with a sharing circle. Ask students to describe the most interesting and unusual homes that were found. Can they name any homes that probably exist in the area but were not found? Ask each student what his/her favorite desert animal is and where it lives? Would that animal be harmed if its home were destroyed? Where might it find a new home?

EXTENDING THE EXPERIENCE: Have students create posters or bumper stickers that support preservation of desert animals' homes. Have students choose a natural area in or near the schoolyard to adopt and improve as a *habitat* for animals. Improvement of habitat can include litter pick-up, fencing against trampling, planting native vegetation, and constructing anti-erosion devices.

Activity 4 Night Sounds

OBJECTIVES: Define the concepts of animal communication, *predation*, *territoriality*, *mate-seeking*, *adaptation*, and *mimicry*. Provide examples of how these physical and behavioral adaptations allow animals to survive in their environment.

MATERIALS: Blindfolds, noisemakers. (You will need a pair of identical noisemakers for each pair of students. Examples of noisemakers: shakers and maracas, film canisters containing pebbles, rubber bands that can be twanged, whistles, bells, blocks of wood that can be clapped together.)

SUBJECTS: Language arts, math, science, social studies.

SKILLS: Application, computation, discussion, evaluation, listening.

METHOD: This game is designed to demonstrate the importance of sound in such animal behaviors as communication, predation, territoriality, mate-seeking, adaptation, and mimicry.

1. Spend some time familiarizing students with the terms listed in the objectives.

2. Explain the procedures of the activity to the students.

3. Blindfold students and have them stand in two parallel lines at least forty feet apart. The students should be standing back to back, with their hands behind their backs.

4. Walk behind each line placing one noisemaker in each student's hands. For the first round, everyone gets something. Have the participants all practice making noise with their devices. Remind students they will not only be making a noise, but must listen closely for the sound of their partner.

5. The leader gives a signal to begin. The participants attempt to find their "mate" by using the noisemakers. When they find their "mate," they should halt, stop making noise, stand quietly together, and wait for the other pairs to find each other.

6. It will be easy for the last two animals to find each other, since they will be the only two making any sound! After all the "mates" have been found, take off the blindfolds, return to a circle, and discuss the activity.

POSSIBLE RESULTS:

1:1 ratio

critter finds its mate

2:1 ratio

two critters find the same mate

1:0 ratio

no mate available or mate not found

7. Are some animals able to find mates more easily than others? Why? If the concept of *predation* does not arise in the discussion, inject it briefly before playing a second round.

8. Have students face outward in the lines again to play a second round. This time, one or two persons will not get a noisemaker. They will be the *predators*. Predators can capture (touch) prey only after the prey makes noise. Play again.

9. After playing a second time, discuss some limitations that may be placed

Fun Facts — SOME ANIMALS OF THE MOJAVE DESERT

BIRDS

Common raven	<i>Corvus corax</i>
Gambel's quail	<i>Callipepla gambelii</i>
Greater roadrunner	<i>Geococcyx californianus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Turkey vulture	<i>Cathartes aura</i>

FISH

Bonytail chub	<i>Gila elegans</i>
Colorado squawfish	<i>Ptychocheilus lucius</i>
Desert pupfish	<i>Cyprinodon</i> spp.
Humpback chub	<i>Gila cypha</i>
Razorback sucker	<i>Xyrauchen texanus</i>

INSECTS AND ARACHNIDS

Broad-necked darkling beetle	<i>Coelocnemis californicus</i>
Giant desert hairy scorpion	<i>Hadrurus arizonensis</i>
Desert tarantula	<i>Aphonopelma chalcodes</i>

MAMMALS

Black-tailed jackrabbit	<i>Lepus californicus</i>
Coyote	<i>Canis latrans</i>
Desert cottontail rabbit	<i>Sylvilagus audubonii</i>
Desert kangaroo rat	<i>Dipodomys deserti</i>
Desert bighorn sheep	<i>Ovis canadensis nelsoni</i>
Desert wood rat	<i>Neotoma lepida</i>
Townsend's big-eared bat	<i>Plecotus townsendii</i>
White-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>

REPTILES AND AMPHIBIANS

Desert tortoise	<i>Gopherus agassizii</i>
Red-spotted toad	<i>Bufo punctatus</i>
Collared lizard	<i>Crotaphytus insularis</i>
Chuckwalla	<i>Sauromalus obesus</i>
Rosy boa	<i>Lichanura trivirgata</i>
Sidewinder	<i>Crotalus cerastes</i>

on predators. Examples include: must capture animal within three seconds after noise has been made; can only capture one or two animals per game. Play the game again.

10. After playing a third round, discuss how the new rules affected predators. What factors in nature limit a predator's success? Conclude by having students name the most important factors in the survival of animals, as presented in this game. Do skills in using senses help animals survive in their environment? How?

EXTENDING THE EXPERIENCE:

Introduce the idea of predators imitating (mimicking) the noise sources in some way. This will help students to see how predators adapt, making it easier for them to capture prey. The game may then be played again. Discuss this new

option (mimicry). Did it affect the game? Are predators the only living things that use mimicry? Although gopher snakes are not poisonous, they have very similar coloration to rattlesnakes, they coil up like rattlesnakes, and they have been observed whipping their tails in dry weeds, producing a rattle-like sound. Why?

Activity 5 Birds And Lizards

OBJECTIVES: List two ways animals use camouflage to their benefit. Describe the difficulty predators have when searching for food (camouflaged animals). Name two common Mojave Desert animals that use camouflage as an adaptation for survival.

ANIMALS

MATERIALS: Pictures of Mojave Desert lizards and birds, such as roadrunners, loggerhead shrikes, and American kestrels; rope to designate starting line; quart-size plastic bags; pipecleaners cut into two-inch strips (two or more strips for each participant). Note: The pipecleaners need to be at least three different colors. One color should blend readily into the environment — for example, light tan for dry leaves and weeds. One color should blend a little less well, and one color should not blend at all. Tan, green, and hot pink are good choices.

SUBJECTS: Physical education, science.

SKILLS: Observation, psychomotor development.

METHOD: This is a simple game, easily adaptable to a variety of animals and environments. The game is played out-of-doors (although it can work indoors on a multi-colored carpet). It works best if played in an area with some ground vegetation as opposed to a bare surface. The game is a relay and a hunt combined into one.

Loggerhead shrikes (a bird) eat large insects, small birds, mice, and lizards. When hunting is good, it stores excess food by impaling it on thorns, cactus needles, or barbed wire. Roadrunners feed on insects, scorpions, lizards, and snakes. They usually run after their prey rather than fly. American kestrels are small hawks and include lizards in their diet.

1. Before the game begins, prepare the field by scattering pipecleaners in an area approximately fifteen feet square. Some of the pipecleaners should be easily seen, and some should hide a bit. The pipecleaners represent camouflaged and non-camouflaged lizards. Don't allow the students to observe your placing of the "lizards." With a rope or by drawing a line, designate a starting line approximately forty feet from the "lizards."

2. Share the pictures of birds and lizards with the students. These birds hunt and eat lizards (and they eat other things as well.) Discuss the physical and behavioral adaptations that each animal (lizard or bird) uses to survive. For what kind of habitat might each lizard be best suited, judging from its coloration?

3. Divide the group into two or three equal teams, each bearing the name of a lizard-eating bird. Have students line up behind the starting line. Allow plenty of space between teams. The first person in line in each team receives a plastic bag, which represents the bird's stomach.

4. Students will quickly walk, not run, from the starting line to the lizard area, pick up the first lizard they see (they may only retrieve one lizard at a time), place it in the "stomach," and quickly walk back to the starting line, where they hand the "stomach" to the next team-member. The leader goes to the back of the line. If you choose to make this a competitive game, the winning team is the one that goes through the entire line first.

5. After playing one round, have the groups examine the contents of their plastic bags. Which color lizard was "eaten" the most, the second-most, and the least? The brightly colored, non-camouflaged lizard should be the most abundant.

6. Play another round or two of the activity. The time it takes for a team to complete a round will grow longer as it becomes more difficult to hunt for the lizards. After the game is over, have students scour the area to search for lizards that still might be hiding. The students will be surprised at how many lizards they missed!

EXTENDING THE EXPERIENCE: Have students research how camouflage is used by other animals world-wide. Challenge them to find pictures of the best camouflaged and the most strangely

camouflaged animals. Have them find pictures of brightly colored animals. How can they survive when they are so easily seen? Are there ever any advantages to being brightly colored?

Activity 6 Keeping Cool

OBJECTIVES: Demonstrate the concept of thermo-regulation and how exothermic (see definition in Method section) animals must work to keep their body temperature regulated. Name two strategies employed by exothermic animals for regulating body temperature. Name two common exothermic animals of the Mojave Desert.

MATERIALS: Fahrenheit thermometers (each team of two needs one), sets of cardboard insects (seven insects in each set), masking tape, scratch paper and pencil, watch for activity leader.

Note: Make insects out of colored cardboard. Attach thermometers to colored cardboard. Each team needs a thermometer and insects with matching colors.

SUBJECTS: Language arts, math, science.

SKILLS: Analysis, application, discussion, inference, problem solving, prediction, small group work.

METHOD: Students will use a thermometer to simulate a lizard. The thermometer "lizard" will have to travel to find food, while maintaining a pre-determined average temperature.

All animals must maintain body temperatures within certain ranges to stay active and alive. Animals can be divided into two general groups according to the way they maintain their body temperatures — endotherms (inside heat) and exotherms (outside heat). Mammals and birds are endotherms and produce heat

within their bodies, allowing them to maintain a fairly constant body temperature, regardless of outside temperatures.

All other animals (amphibians, fish, reptiles) obtain most of their heat from the environment. Many exotherms regulate their body temperatures by moving into warmer or cooler spots in their environment. Lizards and snakes, for example, alternate between basking in the sun and resting in the shade to keep their body temperatures within the range that permits them to stay active and alive. Exotherms can also regulate their body temperature by burrowing and by varying the angle of their exposure to the sun.

PREPARATION: This game is to be played outdoors and works best on a sunny, warm day. Find an area where two lines can be drawn about fifty feet apart. If possible, choose a location containing shrubs or rocks that provide shade spots and some full sunlight areas.

ACTIVITY:

1. Let the children pair up, and give one thermometer to each team. Explain how to read the thermometer, then challenge each team to find the highest and the lowest temperatures in the activity site.

2. After about five minutes, call the group together. Add the highest temperature found by the group to the lowest temperature and divide by two to find the average temperature.

3. Instruct the teams to place one piece of masking tape on their thermometer two degrees above the average temperature and another piece of tape two degrees below the average.

4. Ask if anyone in the group has ever had a fever. Explain that humans and other mammals produce heat inside their bodies and have a steady temperature regardless of outside temperatures. If our body temperatures go up or down

even a few degrees from 98.6°F, we can get sick or even die.

5. Explain that unlike humans, animals such as lizards, snakes, and frogs get most of their body heat from their surroundings. On hot days, a lizard's body temperature goes up; on cold days, the lizard's body temperature goes down. Introduce the terms endotherm and exotherm to the group.

6. Tell the students that they are going to play a game in which they pretend their thermometers are a special kind of lizard. Give a set of insects to each team. The set's color should match the color of their "lizard."

7. Explain the procedures of the game:

- (A) Each team will place its lizard's food (the insects) in various places within the activity area. Be sure some are placed in sun, some in shade, and some in partial shade.

- (B) Teams have about fifteen minutes to move their lizards around as they look for food. The lizard can eat only one insect every two minutes. Each team watches the thermometer window at all times to be sure the lizard does not get too hot or too cold. The top of the mercury column should always be visible in the window.

- (C) If the temperature is going too low, the lizard must warm up in the sun. If it is going too high, the lizard must cool down in the shade. Perhaps a partially shaded area will be just right as the lizard digests its insect and waits for the next one. The students may not use their own bodies as shade for the lizards.

- (D) When the leader calls out "insect," the teams move their lizards along the ground to the first insect. The insect is gathered up, and each team decides where the lizard will rest as it digests its food. The lizard may move during this time if the temperature is going too high

or too low.

- (E) After two minutes the leader calls out "insect" again, and the process is repeated.

- (F) After all insects have been "eaten," the students will gather together and discuss their lizards' search for food.

8. Allow the teams a few minutes to place their insects around the area and begin the game.

9. Discussion questions at the end of the activity might be: Were you able to keep your lizard within the safe range? Did any lizard heat up or cool down too much? If so, what might have happened to your lizard? Did your lizard have to do a lot of scurrying around to survive?

What might happen to a desert lizard if you took it home for a pet? How can lizards cool off or heat up other than by moving to the shade or sunlight? How do you cool off when you get too hot? What do you do now that you could not do if your body temperature responded to surrounding temperatures in the same way as your lizard?

EXTENDING THE EXPERIENCE: Real lizards commonly burrow into the ground to escape hot and cold temperatures. Let the teams play another game in which they can bury their lizards in order to maintain the lizards' temperatures at a safe level.

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Discovery Activity Page #1

